

REMARKS

Claims 28-58, 71-84, 86-93, and 95-107 are pending after inclusion of the present amendment.

In the Office Action dated October 28, 2010 (the "Office Action"), the Examiner took the following actions: (1) indicates the revocation and substitute power of attorney filed on March 5, 2007 may be defective; (2) statement of priority claiming the benefit of U.S. Provisional Application No. 60/032,771 is defective and has not been accepted; (3) objected to the specification; (4) rejected claims 103, 105-107 under 35 U.S.C. 112, first paragraph, as failing to distinctly claim the subject matter; (4) rejected claims 103-107 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 5,928,151 to Hossack et al. ("Hossack"); and (5) allowed claims 28-58, 71-84, 86-93 and 95-102.

Powers of Attorney/Assignee Information

With respect to the Examiner's comments regarding powers of attorney, the undersigned is acting in a representative capacity at least under 37 C.F.R. 1.34. The Examiner has characterized the assignment accompanying the revocation and substitute power of attorney as expressly stating that it is for U.S. Patent No. 6,283,919. See the Office Action at page 3. The assignment, however, transfers rights to more than merely the '919 patent. The statement under 37 C.F.R. 3.73(b) is admittedly specifically for the '919 patent, and does not cover the present application. Given that, a 3.73(b) statement by assignee for the present application will be submitted in the near future with a revocation and substitute power of attorney to expressly appoint power of attorney to the attorneys and agents associated with Dorsey & Whitney LLP, Customer Number 27,076.

Interference

The Examiner's summary of the file history for the present application is appreciated. As indicated at page 5 of the Office Action, examination of the present application is not yet complete under 37 C.F.R. 41.102(a). The present response is directed to moving the examination toward completion, at which time interference may be considered.

Election/Restrictions

At this time, all claims presently pending in the present application will remain in the present application. Cancellation of claims not believed to be part of the interference proceeding may be cancelled at a later time, however.

Claim Status

It is agreed that the currently pending claims are 28-58, 71-84, 86-93, and 95-107 as filed March 30, 2009.

Priority

In order to clarify the priority claim for the present application, the specification has been amended as follows:

This application is a divisional application of U.S. Patent Application Serial No. 09/247,343, filed February 8, 1999, now issued as U.S. Patent No. 6,283,919, which is a divisional application of U.S. Patent application serial number 08/943,546, filed October 3, 1997 and entitled "ULTRASONIC DIAGNOSTIC IMAGING OF RESPONSE FREQUENCY DIFFERING FROM TRANSMIT FREQUENCY", now issued as U.S. Patent No. 5,879,303, which is a continuation-in-part of U.S. Patent Application No. 08/723,483, filed September 27, 1996, now issued as U.S. Patent No. 5,833,613; U.S. Patent application serial number 08/943,546 further claims the benefit of U.S. Provisional Application No. 60/032,771, filed November 26, 1996.

To clarify, the 08/723,483 application does not claim priority from the 60/032,771 provisional application, but the 08/943,546 application does. The present application, in summary, has a priority date as early as September 27, 1996 and is supported by the description of the '919 patent, the '303 patent, the '613 patent, and the '771 provisional patent application.

Divisional vs. Continuation-in-Part Benefit

The Examiner argues that the present application does not receive the benefit of an earlier filing date under 35 U.S.C. 121 because the '343 application "fails to provide adequate support or enablement in the matter provided by the first paragraph of 35 U.S.C. 112 for one or

more claims in [the present] application.” See the Office Action at page 9. The Examiner further identifies specific examples in support of the argument. See the Office Action at pages 9-10.

As will be described in more detail below, claims 103-107 are supported at least by the specification of the ‘343 application as required under 35 U.S.C. 112, first paragraph, despite the Examiner’s assertions otherwise. Consequently, the present application receives the benefit of the earlier filing date under 35 U.S.C. 121.

The following remarks address the Examiner’s specific examples at pages 9-10 of the Office Action. An Attachment to the response, however, provides more detailed identification for the support of claims 103-107 with reference to the ‘919 patent (i.e., the ‘343 application).

The Examiner argues that the phrase “subject being free of added ultrasound contrast agent throughout the entire imaging session” is not supported

Applicants disagree. The Abstract refers to “tissue harmonic images,” and at col. 2, lines 16-29 it is described that contrast agents can return signals for harmonic imaging. The next paragraph makes the transition to tissue harmonic imaging, describing that “[t]issue and fluids will, even in the absence of a contrast agent, develop and return their own non-fundamental frequency echo response signals, including signals at harmonics of the fundamental.” See col. 1, lines 16-29 (emphasis added). Additionally, the ‘771 provisional patent application describes that “[i]t has been found that such harmonic imaging *in the absence of contrast agents* can reduce near field clutter in the ultrasonic image.” See page 2, lines 28-30 (emphasis added). Additional support may be found in the summary of the invention which refers to “imaging tissue and fluids.” See col. 1, line 62 (emphasis added); see also col. 3, lines 45-48 (“Tissue and cells in the body alter the transmitted fundamental frequency signals during propagation and the returned echoes contain harmonic components of the originally transmitted fundamental frequency.”) (emphasis added); col. 5, lines 6-7 (“harmonic imaging of tissue and blood”) (emphasis added); col. 5, lines 18-19 (“The harmonic response from the tissue is then detected and displayed.”) (emphasis added).

The Examiner suggests that a description of what is old and known, as well as not “expressly stating applicants had possession of either a method or apparatus to be used solely in

absence of contrast agent throughout the entire imaging session” results in the specification failing to support the limitation. See the Office Action at page 10. However, 35 U.S.C. 112 does not require an express statement of possessing the invention, but sets forth that the specification shall contain a written description of the invention and enable a person ordinarily skilled in the art to make and use the invention. Neither of these requirements have been interpreted as requiring an express statement of possessing an invention, as suggested by the Examiner. Also, as well known, the Background section in which “old and known properties” are described is part of the specification. See 37 C.F.R. 1.77(b).

The Examiner further argues that describing a contrast signal detector in the present application supports the argument that the specification fails to support a “subject being free of added ultrasound contrast agent throughout the entire imaging session.” The contrast signal detector, however, is not needed for tissue harmonic imaging. The system shown in Figure 1 can perform B mode tissue harmonic imaging (processor 37), contrast harmonic imaging (detector 128), Doppler imaging (processor 130), and perform 3D reconstruction of all three (3D imaging rendering 162), since the processor 37, detector 128 and processor 130 all have outputs coupled to 3D image rendering 162. Contrast agents return harmonic signals just as tissue and blood cells do, and those harmonic contrast echo signals can be imaged in the same way as tissue harmonic signals from the B mode processor are imaged. All can be rendered as 3D reconstruction images. The contrast signal detector is shown because Figure 1 illustrates an example of a complete system capable of both tissue harmonic imaging and contrast agent imaging.

The Examiner argues that the phrase “at least a harmonic band” is not supported

The phrase “at least a harmonic band” means that at a minimum there is a harmonic band. The specification of the ‘919 patent provides support for the phrase “at least a harmonic band” to satisfy 35 U.S.C. 112. For example, the specification at col. 4, line 54-col. 5, line 5, describes filtering of information signals with a second frequency band, that is, the harmonic band. Additional support may be found in the description related to Figures 14 and 10.

Moreover, with reference to Hossack, Hossack describes a fundamental filter 24 and a harmonic filter 26. This is no different from digital filter 118 described in the ‘919 patent. See col. 4, lines 42-49. Hossack’s filters produces “at least a harmonic band,” as does filter 118.

The Examiner's implication that Hossack is using more than just harmonic signals is refuted by what Hossack describes.

The Examiner argues that the concept of the Doppler image can be selected from either variance or combinations of the claimed group is not supported

Claim 105, which recites "variance" in the group from which a Doppler image may be selected, has been amended to delete the term "variance." The Examiner's argument regarding this issue is now moot.

Provisional Application – 60/032,771

The Examiner argues that the '771 provisional patent application does not provide 35 U.S.C. 112, first paragraph, support for a system of 3D reconstruction during an imaging session where the subject is free of added ultrasound contrast agent throughout the entire imaging session. See the Office Action at pages 11-12.

The '771 provisional, however, satisfies 35 U.S.C. 112, first paragraph, in that the figures along with the description fully describe 3D reconstruction and an imaging session free of added contrast agent. For example, as described at page 2, lines 28-30 of the '771 provisional patent application, "[i]t has been found that such harmonic imaging *in the absence of contrast agents* can reduce near field clutter in the ultrasonic image." (Emphasis added.) The immediately preceding paragraph describes the ultrasound system shown in the drawing and states that the harmonic echo signals from the tissue are detected and processed by either the B mode processor 37 or the contrast signal detector 128. Both of these processors are shown to have their outputs coupled to 3D image rendering 132 with the 3D image coupled to the video processor 140 for display on display 50. Thus, those ordinarily skilled in the art would recognize that 3D imaging without adding contrast agent is contemplated and sufficiently described in the '771 provisional patent to satisfy 35 U.S.C. 112, first paragraph.

Reissue Corrections

The reissue '118 application has now been examined and a first Office action mailed March 30, 2011. In the Office action the re-issue declaration was found acceptable and the application appears to now properly claim priority from the '483 application. Some of the

claims of the reissue '118 application are currently rejected. However, the Examiner in the reissue '118 application has not raised any issues regarding the priority claim from the '483 application.

Inventorship

The inventorship for the present application will not be changed at this time.

Specification Objections

The Examiner has objected to the specification for failing to provide proper antecedent basis for the claimed subject matter. See the Office Action at page 13.

In particular, the Examiner argues that the disclosure fails to support the claim limitation of the "subject being free of added ultrasound contrast agent throughout the entire imaging session." See the Office Action at pages 13-14.

The specification of the present application provides the same disclosure as the specification for the '343 application from which the present application claims priority. As previously discussed with respect to the Examiner's arguments that the present application does not receive the benefit of the filing date for the '343 application, the limitation of a "subject being free of added ultrasound contrast agent throughout the entire imaging session" is supported as required by 35 U.S.C. 112, first paragraph. The previous arguments are also relevant to the Examiner's objections to the present specification and establish that the present specification provides clear support for the meaning of "subject being free of added ultrasound contrast agent throughout the entire imaging session," as recited in claims 103-107.

As with the Examiner's previous argument, the Examiner argues that expressly stating that applicants had possession of either a method or apparatus to be used solely in the absence of contrast agent throughout the entire imaging session," is necessary to sufficiently support the claim limitation. See the Office Action at page 14. However, 37 C.F.R. 1.75(d)(1) does not require an express statement of possessing the invention, but sets forth that "terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description." As identified above, the meaning of the phrase "subject being free of added ultrasound contrast

agent throughout the entire imaging session” finds clear support in the specification of the present application.

The Examiner further objects to the specification for failing to provide antecedent basis for “at least a harmonic band” as recited in claims 103 and 105-107. The previous arguments made in response to the Examiner’s arguments that the present application does not receive the benefit of the filing date for the ‘343 application, are also relevant to the Examiner’s objections to the specification. As applied to the present specification, the meaning of the phrase “at least a harmonic band” finds clear support. For example, at page 9, line 17-page 10, line 3, describes filtering of information signals with a second frequency band, that is, the harmonic band. Additional support may be found in the description related to Figures 14 and 10.

The Examiner further objects to the specification for failing to support “the concept that the Doppler image can be selected from either variance or combinations of the claimed group.” See the Office Action at page 14. As previously discussed, claim 105 has been amended to recite “displaying a Doppler image selected from the group of: velocity, energy and combinations thereof.” As a result, the Examiner’s objection for this reason should be withdrawn.

Claim Rejections – 35 U.S.C. 112

Claims 103 and 105-107 have been rejected for failing to claim a feature which is taught as critical in the specification. In particular, the Examiner argues that the present application describes that “only” the harmonic return signals are used to produce the ultrasonic image, but that claims 103 and 105-107 recite limitations that suggest the second plurality of signals include more than just the harmonic return signals. See the Office Action at page 15.

The material cited by the Examiner at page 12 reads, “[b]ut when only the harmonic return signals are used” The term “only” in the context of the description is used to qualify a particular embodiment, that is, the embodiment *when* only harmonic return signals are used. The term “only” is not used in the context of limiting the scope of the invention as contemplated and described in the specification to the specific example, which is argued by the Examiner, but to describe that there may be some advantages if only harmonic return signals are used. Other embodiments of the invention, however, are not limited to using only harmonic

return signals, and displays signals which are blended from both fundamental and harmonic echo signals.

The Examiner further rejects claims 103 and 105-107 because there is insufficient antecedent basis for the limitation "said imaging session." See the Office Action at page 15. Claims 103 and 105-107 have been amended to properly introduce "an imaging session" to resolve the issue.

Claim Rejections – 35 U.S.C. 102

The Examiner has rejected claims 103-107 under 35 U.S.C. 102(e) as being anticipated by Hossack and further rejected claims 103-107 under 35 U.S.C. 102(f) arguing that the applicant of the present application did not invent the subject matter of claims 103-107. See the Office Action at page 16.

Hossack is not prior art based on the priority date of the present application, which is at least as early as September 27, 1996 by virtue of the filing date of the '483 application which issued as U.S. Patent No. 5,833,613. As previously discussed, claims 103-107 are supported by at least the '483 application as required by 35 U.S.C. 112, first paragraph, and benefit from the earlier filing date. Consequently, the rejection of the claims under 35 U.S.C. 102(e) based on Hossack cannot be maintained and must be withdrawn.

As to the rejection of claims 103-107 under 35 U.S.C. 102(f), the invention of claims 103-107 was contemplated and sufficiently described under 35 U.S.C. 112, first paragraph, as early as September 27, 1996 in the '483 application. Hossack was not filed until August 22, 1997, nearly 11 months after the filing of the '483 application. As shown by the timing of the filing of the '483 application and Hossack, applicants were in possession of the invention of claims 103-107 prior to Hossack.

For the foregoing reasons, the rejection of claims 103-107 under 35 U.S.C. 102(e) as being anticipated by Hossack should be withdrawn.

All claims are in condition for allowance. Favorable consideration and a timely Notice of Allowance are earnestly solicited.

Respectfully submitted,
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Enclosures:
Annotated Claims 103-107

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ANNOTATED CLAIMS 103-107

Claims 103-107 (including amendments made herein) have been annotated to cite description providing support for the corresponding limitation, with reference to U.S. Patent No. 6,283,919 (application serial no. 09/247,343).

103. (Original) A method for producing a three dimensional reconstruction with an ultrasound system, the method comprising the steps of:

(a) transmitting ultrasonic energy at a first frequency band (1.67 MHz, col 3, lines 7-15) into a subject during an imaging session, said subject being free of added ultrasound contrast agent throughout the entire imaging session; (col. 3, lines 45-48)

(b) receiving ultrasonic echo information (col. 3, lines 19-24) associated with said transmitted ultrasonic energy;

(c) filtering from said echo information a plurality of information signals associated with a second frequency band (3.34 MHz), said second frequency band comprising at least a harmonic band of said first frequency band (col. 4, lines 50-54); and

(d) forming the three-dimensional reconstruction in response to said information signals (col. 4, line 54 to col. 5, line 5).

104. (Original) An ultrasound apparatus adapted for generating a three dimensional reconstruction of a subject during an imaging session, said subject being free of added ultrasound contrast agent throughout the entire imaging session, said apparatus comprising:

a transducer; (#112)

a transmit beamformer (#117, #120) operatively connected to said transducer for transmitting ultrasonic energy into a subject during said imaging session, said subject being free of added ultrasound contrast agent throughout the entire imaging session;

a receive beamformer (#116) operatively connected to said transducer and configured to obtain echo information;

a filter (#118) operatively connected to said receive beamformer and operative to filter from said echo information a plurality of information signals associated with a harmonic frequency band, said harmonic frequency band comprising harmonics of a fundamental frequency band transmitted into the subject; and

wherein the three-dimensional reconstruction (#162) is responsive to said information signals.

105. (Original) A method for producing a three dimensional reconstruction with an ultrasound system, the method comprising the steps of:

(a) transmitting ultrasonic energy at a first frequency band (1.67 MHz, col 3, lines 7-15) into a subject during an imaging session, said subject being free of added ultrasound contrast agent throughout the entire imaging session;

(b) receiving ultrasonic echo information (col. 3, lines 19-24) associated with said transmitted ultrasonic energy;

(c) obtaining from said echo information a plurality of detected Doppler information signals associated with a second frequency band (3.34 MHz), said second frequency band comprising at least a harmonic band of said first frequency band (col. 4, lines 50-54);

(d) forming the three-dimensional reconstruction in response to said information signals (col. 4, line 54 to col. 5, line 5); and

(e) displaying a Doppler image (col. 4, lines 59-64) selected from the group of: velocity, energy and combinations thereof, the Doppler image being responsive to said three dimensional reconstruction.

106. (Original) A method for producing a three dimensional reconstruction with an ultrasound system, the method comprising the steps of:

(a) transmitting ultrasonic energy at a first frequency band (1.67 MHz, col 3, lines 7-15) into a subject during an imaging session, said subject being free of added ultrasound contrast agent throughout the entire imaging session, said ultrasonic energy characterized by a peak power level near said first frequency band (Fig. 4, FL1);

(b) receiving ultrasonic echo information (col. 3, lines 19-24) associated with said transmitted ultrasonic energy;

(c) obtaining from said echo information a plurality of information signals associated with a second frequency band (3.34 MHz), said second frequency band comprising at least a harmonic band of said first frequency band (col. 4, lines 50-54), and a second plurality of information signals associated with said first frequency band;

(d) forming the three-dimensional reconstruction in response to said information signals (col. 4, line 54 to col. 5, line 5); and

(e) displaying a composite image responsive to said three dimensional reconstruction and representing three dimensions, said composite image comprising spatially distinct near-field and far-field regions, said far-field region emphasizing information signals in the first frequency band and said near-field region emphasizing information signals in the second frequency band (col. 11, lines 47-52).

107. (Original) A method for producing a three dimensional reconstruction with an ultrasound system, the method comprising the steps of:

(a) transmitting ultrasonic energy at a first frequency band (1.67 MHz, col 3, lines 7-15) into a subject during an imaging session, said subject being free of added ultrasound contrast agent throughout the entire imaging session;

(b) receiving ultrasonic echo information (col. 3, lines 19-24) associated with said transmitted ultrasonic energy;

(c) obtaining from said echo information a first plurality of information signals associated with said first frequency band (1.67 MHz) and a second plurality of information signals associated with a second frequency band (3.34 MHz), said second frequency band comprising at least a harmonic band of said first frequency band (col. 4, lines 50-54);

(d) compounding the first and second plurality of information signals (#48; col. 9, lines 12-25); and

(e) forming the three-dimensional reconstruction as a function of said compounded information signals (col. 4, line 54 to col. 5, line 5).